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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/829,488 | 04/22/2004 | Lanzhong Wang | 100203738-1 | 6921 |
| 22879 | 7590 | 11/01/2006 | EXAMINER | |
| HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400 | | | LOVEL, KIMBERLY M | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2167 | |

DATE MAILED: 11/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|-----------------|--------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/829,488 | WANG ET AL. |
| | Examiner | Art Unit |
| | Kimberly Lovel | 2167 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 22 April 2004.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-25 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-25 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 22 April 2004 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date 4/22/04.

4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) Notice of Informal Patent Application
 6) Other: _____.

DETAILED ACTION

1. Claims 1-25 are rejected.

Claim Objections

2. Claims 1-3 are objected to because of the following informalities:

Claims 1-3 recite the terminology "may be." The term renders the claim unclear since it is not known whether the limitation following the term is an optional limitation or a required limitation.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-5 and 17-25 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1 and 17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims are directed toward "a computer-readable medium" which "causes operations to be performed," and are non-statutory because they encompass subject matter and/or embodiments which do not fall within a statutory category.

The meaning of "computer-readable medium" as disclosed in the Specification, paragraph [0011], lines 10-13, covers non-statutory embodiments which improperly

include network transmission lines (interpreted as wired and wireless transmission), wireless transmission media, signals propagating through space, radio waves, infrared signals, etc.

According to MPEP 2106:

There is always some form of physical transformation within a computer because a computer acts on signals and transforms them during its operation and changes the state of its components during the execution of a process. Even though such a physical transformation occurs within a computer, such activity is not determinative of whether the process is statutory because such transformation alone does not distinguish a statutory computer process from a nonstatutory computer process. What is determinative is not how the computer performs the process, but what the computer does to achieve a practical application. See *Arrhythmia*, 958 F.2d at 1057, 22 USPQ2d at 1036.

Claims 2-5 and 18-20, which are dependent respectively on claims 4 and 18 fail to overcome the rejection and therefore are rejected on the same grounds as claims 4 and 18.

Claim 21 recites a system. However, the system as recited can be entirely embodied in software *per se*. Software is considered to represent non-statutory subject matter.

According to MPEP 2106:

The claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se*.

Descriptive material can be characterized as either “functional descriptive material” or “nonfunctional descriptive material.” Both types of “descriptive material” are nonstatutory when claimed as descriptive material *per se*, 33 F.3d at 1360, 31 USPQ2d at 1759. When functional descriptive material is recorded on some computer-readable medium, it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the

function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994)

Merely claiming nonfunctional descriptive material, i.e., abstract ideas, stored on a computer-readable medium, in a computer, or on an electromagnetic carrier signal, does not make it statutory. See *Diehr*, 450 U.S. at 185-86, 209 USPQ at 8 (noting that the claims for an algorithm in *Benson* were unpatentable as abstract ideas because “[t]he sole practical application of the algorithm was in connection with the programming of a general purpose computer.”).

Claims 22-25, which are dependent on claim 21 fail to overcome the rejection and therefore are rejected on the same grounds as claim 21.

To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No 5,850,538 to Steinman (hereafter Steinman) in view of US Patent No 6,901,207 to Watkins (hereafter Watkins).

Referring to claim 1, Steinman discloses a data structure [queue data structure] comprising:

a sorted portion that contains a plurality of entries that are sorted into an order [main priority queue] (see column 6, line 65 – column 7, line 4);

an unsorted portion that contains a plurality of entries that have not been sorted [temporary holding queue] (see column 6, line 65 – column 7, line 4); and

a boundary that separates the sorted portion and the unsorted portion [two separate lists] (see column 6, line 65 – column 7, line 9).

wherein the sorted portion of the data structure may be searched with $O(\log N)$ (see column 9, lines 31-36) performance and an entry is added to the unsorted portion [temporary queue] (see column 6, line 65 – column 7, line 9) in order to quickly and efficiently store large quantities of entries in a data structure.

However, Steinman fails to explicitly disclose the further limitation wherein the data structure is searched while an entry is added. Watkins discloses capturing and searching large sets of data (see abstract), including the further limitation wherein the data structure is searched while an entry is added (see column 19, lines 45-58).

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the concept of concurrent addition of entries and searching with the data structure of Steinman. One would have been motivated to do so in order to quickly and efficiently store large quantities of entries in a data structure.

Referring to claim 2, the combination of Steinman and Watkins (hereafter Steinman/Watkins) discloses the data structure of claim 1, wherein the sorted portion may be searched with a binary search [$O(\log N)$] (Steinman: see column 9, lines 31-36).

Referring to claim 3, Steinman/Watkins discloses the data structure of claim 1, wherein the unsorted portion may be searched with an incremental search (Steinman: see column 9, lines 31-36).

Referring to claim 4, Steinman/Watkins discloses the data structure of claim 1, wherein the data structure may be sorted to form a new sorted portion that comprises the plurality of entries of the sorted portion [main priority queue] and the plurality of entries of the unsorted portion [temporary holding queue], and the plurality of entries of the new sorted portion are sorted into an order [temporary queue is sorted and merged the main priority queue] (Steinman: see column 7, lines 1-18).

Referring to claim 5, Steinman/Watkins discloses the data structure of claim 1, wherein the data structure is associated with an occurrence model used in designing a circuit (Watkins: see column 19, lines 50-57).

Referring to claim 6, Steinman discloses a method of using a container that comprises a sorted portion [main priority queue] that contains a plurality of entries that are sorted into an order, an unsorted portion that contains a plurality of entries that have

not been sorted [temporary holding queue], and a boundary that separates the sorted portion and the unsorted portion [two separate lists] (see column 6, line 65 – column 7, line 9), the method comprising:

receiving a search request that comprises a requested value (see column 6, line 65 – column 7, line 9);

searching the sorted portion of the container for the requested value with $O(\log N)$ performance (see column 6, line 65 – column 7, line 9);

adding an entry to the unsorted portion [temporary queue] during the searching (see column 7, lines 3-4);

and returning a stored value of the container if there is a match of the stored value and the requested value (see column 6, line 65 – column 7, line 9).

However, Steinman fails to explicitly disclose the further limitation wherein the data structure is searched while an entry is added. Watkins discloses capturing and searching large sets of data (see abstract), including the further limitation wherein the data structure is searched while an entry is added (see column 19, lines 45-58).

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the concept of concurrent addition of entries and searching with the method of Steinman. One would have been motivated to do so in order to quickly and efficiently store large quantities of entries in a data structure.

Referring to claim 7, Steinman/Watkins discloses the method of claim 6, wherein when there is not a match, the method further comprises: returning a null value

that indicates that there is no match with the requested value (Steinman: see column 7, lines 1-18).

Referring to claim 8, Steinman/Watkins discloses the method of claim 6, wherein when there is not a match, the method further comprises: adding an entry to the unsorted portion corresponding to the search request (Steinman: see column 7, lines 3-4).

Referring to claim 9, Steinman/Watkins discloses the method of claim 6, wherein when there is not a match, the method further comprises:

determining whether unsorted items in the container exceed a predetermined threshold [the event horizon has been crossed] (Steinman: see column 7, lines 1-18); performing a sort operation on the container, if the predetermined threshold is exceeded, thereby forming a new sorted portion that comprises the plurality of entries of the sorted portion [main priority queue] and the plurality of entries of the unsorted portion [temporary holding queue], and the plurality of entries of the new sorted portion are sorted into an order [temporary queue is sorted and merged with the main priority queue] (Steinman: see column 7, lines 1-18).

Referring to claim 10, Steinman/Watkins discloses the method of claim 9, further comprises: searching the new sorted portion of the container for the requested value; and returning a stored value of the container if there is a match of the stored value and the requested value (Steinman: see column 9, lines 31-36).

Referring to claim 11, Steinman/Watkins discloses the method of claim 10, wherein searching the new sorted portion comprises: searching with $O(\log N)$ performance (Steinman: see column 9, lines 31-36).

Referring to claim 12, Steinman/Watkins discloses the method of claim 6, wherein when there is not a match, the method further comprises: searching the unsorted portion of the container for the requested value; and returning a stored value of the container if there is a match of the stored value and the requested value (Steinman: see column 9, lines 31-36).

Referring to claim 13, Steinman/Watkins discloses the method of claim 12, wherein the unsorted portion may be searched with an incremental search [$O(n)$] (see column 9, lines 31-34).

Referring to claim 14, Steinman/Watkins discloses the method of claim 6, wherein when there is not a match, the method further comprises: determining whether a size of the unsorted portion is zero; adding an entry to the unsorted portion corresponding to the search request if the unsorted portion is not zero (Steinman: see column 7, lines 1-18).

Referring to claim 15, Steinman/Watkins discloses the method of claim 14, wherein the size of the unsorted portion is zero, the method further comprises: determining whether the requested value of the search request is greater than the value of the last entry of the sorted portion; adding an entry to the unsorted portion corresponding to the search request if the requested value of the search request is not greater than the value of the last entry of the sorted portion; adding an entry to the

sorted portion corresponding to the search request if the requested value of the search request is greater than the value of the last entry of the sorted portion (Steinman: see column 7, lines 1-18).

Referring to claim 16, Steinman/Watkins discloses the method of claim 6, further comprises: using the container in an occurrence model in designing a circuit (Watkins: see column 19, lines 50-57).

Referring to claim 17, Steinman discloses a computer program product having a computer-readable medium having computer program logic recorded thereon for inserting a new value into a container that comprises a sorted portion [main priority queue] that contains a plurality of entries that are sorted into an order, an unsorted portion [temporary priority queue] that contains a plurality of entries that have not been sorted, and a boundary that separates the sorted portion and the unsorted portion (see column 9, lines 31-36), the computer program product comprising:

code for searching the sorted portion of the container for the new value with $O(\log N)$ performance (see column 6, line 65 – column 7, line 9 and column 9, lines 31-36);

code for searching the unsorted portion of the container if no match is found in the search of the sorted portion with $O(N)$ performance (see column 9, lines 31-36); and

code for inserting the new value into the container if no match is found in the search of the unsorted portion (see column 6, line 65 – column 7, line 9).

However, Steinman fails to explicitly disclose the further limitation wherein the data structure is searched while an entry is added. Watkins discloses capturing and

searching large sets of data (see abstract), including the further limitation wherein the data structure is searched while an entry is added (see column 19, lines 45-58).

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the concept of concurrent addition of entries and searching with the computer program product of Steinman. One would have been motivated to do so in order to quickly and efficiently store large quantities of entries in a data structure.

Referring to claim 18, Steinman/Watkins discloses the computer program product of claim 17, wherein the code for inserting comprises: code for determining whether to insert the new value in the sorted portion or the unsorted portion of the container (Steinman: column 6, line 65 – column 7, line 9 and column 9, lines 31-36 and see column 9, lines 31-36).

Referring to claim 19, Steinman/Watkins discloses the computer program product of claim 17, further comprises: code for sorting the unsorted portion and merging the sorted portion and the sorted unsorted portion into a new sorted portion, wherein the code for sorting is operative when the unsorted portion exceeds a predetermined criteria [the event horizon has been crossed] (Steinman: see column 7, lines 1-18); and code for searching the new sorted portion of the container for the new value with $O(\log N)$ performance (Steinman: see column 9, lines 31-36).

Referring to claim 20, Steinman/Watkins discloses the computer program product of claim 17, further comprises: code for a circuit design (Watkins: see column 5, lines 36-41).

Referring to claim 21, Steinman/Watkins discloses a computer system for managing data objects, comprising:

means for storing said data objects [main priority queue] (see column 6, line 65 – column 7, line 4);

means for identifying a boundary within said means for storing, wherein data objects stored in a first portion [main priority queue] of said storing means defined by said boundary are stored in an ordered manner [sorted] and data objects stored in a second portion [temporary holding queue] of said storing means defined by said boundary are stored in an unordered manner [two separate queues] (see column 6, line 65 – column 7, line 4); and

means for searching said first portion according to $O(\log N)$ performance [$O(\log N)$] to locate an identified object (Steinman: see column 9, lines 31-36).

Referring to claim 22, Steinman/Watkins discloses the computer system of claim 21 further comprising: means for searching said second portion for said identified object according to $O(N)$ performance (see column 9, lines 31-36).

Referring to claim 23, Steinman/Watkins discloses the computer system of claim 21 further comprising: means for adding said identified object to said second portion when said means for searching said first portion and said means for searching said second portion do not locate said identified object.

Referring to claim 24, Steinman/Watkins discloses the computer system of claim 21 further comprising: means for merging data objects in said second portion [temporary holding queue] into said first portion [main priority queue] in an ordered

manner; and means for resetting said boundary in response to said means for merging (Steinman: see column 7, lines 1-18).

Referring to claim 25, Steinman/Watkins discloses the computer system of claim 24 wherein said means for merging is operable when a number of data objects in said second portion reaches a predetermined amount [the event horizon has been crossed] (Steinman: see column 7, lines 3-4).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly Lovel whose telephone number is (571) 272-2750. The examiner can normally be reached on 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Cottingham can be reached on (571) 272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kimberly Lovel
Examiner
Art Unit 2167

27 October 2006
kml

kml
10/30/06


JOHN COTTINGHAM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100


30 October 2006